complications of ropes and engines, machinery made too slim from a false notion that everything to go on soft land should be constructed as light as possible. The consequence was, engines broke down, and farmers' patience and purses became exhausted. The rope was at first an enormous expense. Made of iron wire, it wore out in ploughing 200 acres; and when they tried to strengthen it by adding to its diameter, it absorbed all the power of the engine. Steel at last came in, to prevent the steam plough being swamped. The first rope of this material ploughed 600 acres. A frightful source of the wear and tear of the rope was in the coiling of this wire on the drums, squeezing them into V-shaped grooves; but at last came the beautiful arrangement of the Burton clip drum, by which the rope was clasped as if by a hand of iron, its shape preserved, and instead of winding round and round the drum in order to obtain sufficient holding power by friction, a half turn round it was sufficient for the greatest pull required. The application of this drum, and the improvements in the material, has perfected the system—a steel rope, 11-16ths of an inch in diameter, weighing 2lbs. per yard, will plough 3000 acres; while in the first case the iron rope did a duty of 750 miles, costing 1s.7d. per mile, the steel rope does a duty of 9000 miles, costing 2¼d. per mile. All this time improvements were being made in the engine; its powers of locomotion were increased, so that in its present form it is, besides its adaptation for ploughing, a powerful traction engine, capable of taking a load of twenty tons up an incline of one in fifteen, with a proper steering apparatus, and provided with a large drum for driving a thrashing-machine, circular-saw, &c., &c. The simplicity of the arrangement in reducing friction is further seen in 75 per cent. of the power given out being applied usefully.

The comparison of horses against steam, the next point treated in the paper, is very interesting. First, as to hauling power, four horses exert a power equal to a pull of 6 cwt., and this, on a width of 12 inches, is equal to 70 lbs. per inch, while at the same time they take along with them a weight equal to 4 tons, which is distributed over the fields in footprints. Where the land is unploughed the effect of this treading is to harden and consolidate the ground, and make it more difficult to plough. When ploughed, the footprints take away so much from the useful effect of ploughing, and this is more manifest when it is considered that as many as 300,000 foot-prints are made per acre by four horses while engaged in ploughing; that is, nearly the whole area is trodden over by the horses' feet.

In steam ploughing, a draught of 35 cwt. is given out, equal to 300 lbs. per inch, while the load on the land is 25 cwt., and this is carried on two wheels 6 inches wide, and moving 4 feet apart. The requisites to steam-ploughing are a powerful engine large drums, rope as little bent as possible, and hard, light, and flexible; direct pull on implement, rope kept tight to avoid friction on the ground, soil wedged off by consecutive shares, and as small an amount of manual labour as possible. All these points have been studied in Fowler's system, and the question remains, why has steam-ploughing not been more generally adopted? The writer replies, first, because farming is a slow and uncertain investment, and farmers, generally speaking, are short of capital; secondly, because certain permanent improvements are required to make steam ploughing profitable, such as better roads on the farm, and fields made larger. This properly belongs to the landlord, but very few of them have taken up the matter as they ought. Besides this, as previously mentioned, the first steam ploughs, being constructed too lightly, broke down, and an unfavourable prejudice was excited against them. This objection has now been surmounted, and there seems no reason why steam ploughing should not be generally and universally adopted.—*Mark Lane Express.*

Evaporation from Forests.

The woodlands of a country perform an important office, not only in collecting and retaining the moisture of the soil by overshadowing the land and staying the exhausting process of evaporation, but they, at the same time, spread out from their leaves a boundless evaporating surface to supply the atmosphere with requisite moisture, drawn by the roots from hidden springs within the earth, without exhausting the surface of the soil. The extent of surface which is opened out by the leaves of a forest for evaporation outruns all calculation; and the aggregate amount of water that, by this process, is drawn off into the skies, is equally vast, immeasurable, inconceivable. The Washington elm at Cambridge, a tree of no extraordinary size, was, some years ago estimated to produce a crop of seven millions of leaves, exposing a surface of two hundred thousand square feet, or about five acres of foliage.

By an experiment conducted with great care in Vermont, an acre of forest trees was found to throw off, on the 12th of June, eight hundred and seventy-five gallons in twelve hours. By another independent process, an acre of wheat, in luxuriant growth, has been estimated to give off two thousand five hundred gallons of water in twenty-four hours. A distinguished naturalist, who has bestowed much attention on this subject, has expressed the opinion, that the amount of evaporation from a given surface of woodland is as great or greater than from lake or sea of the same extent. But the evaporation in twenty-four hours from a tropical sea is, according to Maury, equivalent to a sheet of water half an inch in thickness over the evaporating surface.

"All the rivers run into the sea, yet the sea is not full;" because all their waters are taken up by evaporation. "Unto the place whence the rivers come, thence they return again." The sea is but a vast evaporating basin, a part of a stupendous system of hydraulics, by means of which all the rivers of the earth are made to discharge their contents, through the seas, into the skies. How beneficent the providence of God in establishing this stupendous laboratory of nature, for the health and happiness of all the living! The rivers drain from the land, in decaying animals and vegetable matter and noxious miasmata, many ingredients of disease, and flow on to the ocean, turbid, foul, and feculent; charged with pestilence and death. But by this wondrous process of distillation they return, through the skies, pure, fresh, and sweet, shedding down anew streams of life and health and joy over all the earth. But be it remembered the while, that we are not indebted to the ocean alone for these streams of life and health. This vast laboratory is in like ceaseless action over all the wide world, on the dry land as well as upon the sea. The distillations from the forests especially, in proportion to their extent, send up a freer, fuller flow of waters into the heavens, to refresh and water the earth.—*L. Coleman, D.D.*

Composting Muck.

The successful applicant for the premium offered by the Kennebec (Maine), Agricultural Society, for the best experiment in the use of muck, gives the following as his method:

"I dig the muck as soon after haying as I can that being the dryest season of the year, and the sun and the air will have good effect upon it before I take it to the barn-yard. Before moving this muck, after it has been dug, I clear my barn-yard of the previous year's accumulation of dressing, say on the first of November or before the ground freezes—carting it out into the field where I propose to plant corn the next season, or for the purpose of top dressing etc I then haul into the vacant yard the muck, and spread it evenly all over the surface. My cattle are then allowed to run over and stand upon it during the remainder of the fall and winter. In the spring, as soon as it is dry enough, I run the plough through it, and follow this practice often during the summer I yard my cattle on it during the summer nights. I have a barn cellar, into which I drop the manure from my cattle during the winter and spring, and whenever housed. This I fork over in the spring and during the summer, keeping it in the cellar until the last of August or first of September I then commence mixing the pile in my cellar with the muck in the yard, in the proportion of one-third manure from this cellar to two-thirds of the muck in the yard, frequently ploughing them over and incorporating them together as intimately as I can, until it is time to haul into the field.

"I stated that I cleaned my yard just before the ground closed up for the winter, and the sooner it freezes after it is out, the better, as it prevents evaporation or further drying I drop it in a long pile, and stack it into a sharp ridge, like the roof of a house, flatting it, and smoothing the sides with my shovel, which causes it to shed rain, and you will find it all there in the spring. Muck prepared in this way never failed to give me good crops, and proves more lasting for the hay crop than the same amount of manure does. I have now about fifteen cords, which is my usual amount prepared every year."

How to Kill Sorrel.

I notice the statement of Charles Betts, of Burr Oak, Mich., commending stable manure as an effectual eradicator of sorrel from the soil. During the last ten years I have been deeply interested in the pursuit of theoretical and practical agriculture and horticulture, and, among other experiments, I have frequently noted the effects of different fertilizers applied to the soil, in promoting or checking the growth of sorrel. My observation and experience have proved that stable manure and other organic manures, whether animal or vegetable, are as efficacious in promoting the growth of sorrel and other noxious plants, as the growth of corn, wheat, oats, potatoes and other cultivated plants. Peruvian guano, so highly valued on account of the large per centage of ammonia, phosphates of lime and magnesia, has invariably produced a luxuriant growth of sorrel where the seeds or roots were in the soil; and I think that to apply horse manure or guano in sufficiently large quantities to kill sorrel, would greatly injure or probably kill or rather *burn up* the plants you would cultivate. Of all fertilizers that I have seen applied, or even heard of being used on Long Island and in the New-England States near the sea-coast, the moss-bunker (a sea fish, millions of which are annually applied to the soil,) is universally, and I think very justly, reputed as the best manure for the protection of a luxuriant and heavy growth of sorrel. But the question is, *what will kill it?* I am happy to state that I entirely concur with Solon Robinson and Wm. S. Carpenter in commending lime and salt as effectual in destroying this weed—that is, if I may be allowed to add my favourite remedy (potash) to their specifics. As the roots and germs of the sorrel are quite delicate and tender, and as the plants require but little or no potash, I presume that potash is really the safest and most effectual application by which to rid fields of this pest, without injury to cultivated plants. The best time to apply the ashes is in early spring, just as the plant begins to vegetate, when the young shoots are tender.

I. T. Whitbeck, *in Country Gentleman.*

Beets vs. Sorghum for Sugar.

Our esteemed correspondent, "S. W.," in a private note, writes:—"I am surprised that you should give sugar beets the preference to sorghum as a sugar making plant. Beets may be the best in Europe, where land is dear and labour cheap, but not in this country, particularly in the Great West.

That sugar of the best quality can be made from beets, is a well ascertained fact. There is no necessity for experimenting on this point. But with sorghum it is still an open question whether sugar can be profitably made from it. It is grown to a great extent in the West for the manufacture of *molasses*, but it is seldom that *sugar* is made from it, except in very small quantities.

There are, aside from the fact that there is no uncertainty in the business, two reasons why we prefer beets to sorghum. The cultivation of beets, and the consumption of the refuse by cattle, *enriches the farm.* This is well known in Europe, and has given rise to the remark, "the more beets the more grain." Then there is this additional reason in favour of the beet. Sorghum must be worked up at the proper time in the autumn, or there is great danger of loss from chemical changes in the sap, but this is not the case with the beets; they can be kept all winter if need be, and can be worked up when most convenient.—*Genesee Farmer.*

How to Apply Guano.—For drilling, it must first be mixed with four to six times its weight of well-sifted mould. Charcoal in powder, either from peat or wood, is also a most excellent article to be mixed with the guano in the proportions indicated. Its great porosity allows it to retain the volatile ammonia, and in dry weather to absorb considerable moisture from the air. This is of material benefit to plants in their early growth. Before mixing, the guano must be finely pulverized, which may easily be done with a common garden roller upon the floor of a barn or shed, or even by beating it with a common shovel. A layer of ashes, &c., is then spread evenly upon the floor, and a quantity of the fine guano sifted over it. This is followed by another layer of mould or ashes, and another of guano, until the requisite quantity of both is used. The whole must then be repeatedly turned with the shovel until thoroughly mixed. If time will permit, it is now preferable to leave the mixture for eight or ten days. It must then be again sifted, when it will be ready for use. In using guano with the drill, care must be taken that the mixture falls below the seed, and that an inch or so of soil intervenes between them, otherwise the strength of the guano will kill the seed. Garrett's, Hornsby's, and other modern drills are well adapted for depositing guano and other concentrated manures. The above mixture is generally sufficiently damp to fall exactly where the hand directs it. When this is not the case, a small quantity of water should be added. The field must be sown with the mixture in the ordinary manner, and the manure harrowed in; the seed is then drilled as usual. Perhaps the preferable mode would be to broadcast two-thirds of the guano applied, and to drill one-third with the seed. The young plants would then have enough manure under the drills to serve the early stages of growth, while the guano sown broadcast would supply the wants of the plants in a more mature state, when the roots would have spread in every direction in the soil.—*Nesbitt.*